

# KIQK(FM) – Rapid City, SD

## Compliance with Radiofrequency Radiation Guidelines

The potential for human exposure to non-ionizing radiofrequency radiation at the transmitter site has been evaluated. In addition to the KIQK(FM) operation for the transmitter site is also be shared with two other FM facilities. There are no other known broadcast facilities within 315 meters of the shared transmitter site which operate with a power greater than 99 watts ERP.

The KIQK(FM) Facility operates on CH281C1 with a maximum effective radiated power (ERP) of 100.0 kW circular polarization. The facility operates with a fully spaced four element Shively 6810-8 antenna mounted 140 meters above ground level (AGL). This facility was last licensed in 1994. The RFR studies presented are based on those used at that time.

The K289AI Facility operates on CH 289D with a maximum effective radiated power (ERP) of 0.25 kW vertical polarization. The facility operates with a fully spaced a Shively 6912-3-SS antenna mounted 98 meters above ground level (AGL). EPA Type 1 element was assumed as defined by FM Model Version 2.10 Beta issued March 22, 1995<sup>1</sup>.

The KSQY-FM1 Facility operates with a maximum effective radiated power (ERP) of 17.0 kW vertical polarization with an antenna COR mounted 109 meters AGL. For purposes of this study a prior study for KSQY-FM1 is attached to this report.

To evaluate the total exposure to non-ionizing radio-frequency radiation it is necessary to sum the individual contributions as a decimal fraction of the maximum permissible limit. If the resulting sum is less than or equal to 100%, the exposure is concluded to be within the guidelines as set forth in the Rules<sup>1</sup>. To simplify the calculations and produce a “worst case” study, the maximum exposure level produced by each station has been selected without regard to the location of that exposure. The following table is based on the uncontrolled limits set forth in the Rules<sup>1</sup>.

<u>Contributing Station</u>	<u>Maximum Contribution</u>	<u>Uncontrolled Limit</u>	<u>% of Limit</u>
K289AI	0.119 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	0.06%
KIQK(FM) Licensed	13.818 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	6.9%
KSQY-FM1 Licensed	3.10 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	1.6%
		<b>Total % of Limit</b>	<b>6.9%</b>

In addition to the protection afforded by the proposed antenna heights above ground, the facility is properly marked with signs, and entry to the facility is restricted by means of fencing with locked doors and/or gates. Any other means that may be required to protect employees and the general public will be employed.

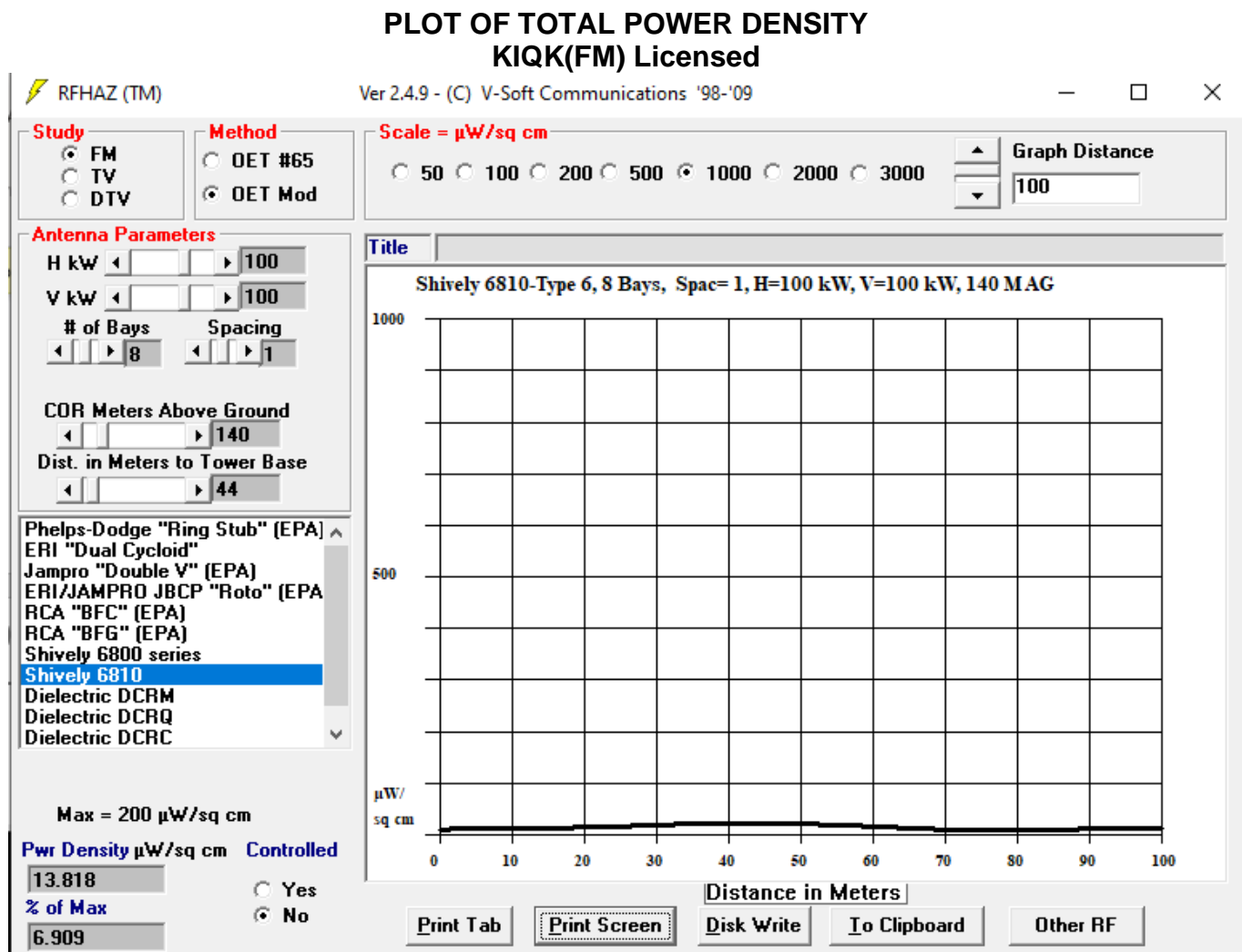
In the event work is required in proximity to the antenna(s) such that the person or persons working in the area will be potentially exposed to fields in excess of the current guidelines, an agreement signed by all broadcast parties at the site will be in effect for the offending transmitter(s) to reduce power, or cease operation during the critical period.

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<sup>1</sup> Software packages were used to determine the individual contribution of each station evaluating compliance with the FCC guidelines concerning human exposure to radiofrequency radiation as detailed in OET Bulletin No. 65 (Edition 97-01). FM radiofrequency radiation levels were predicted using both the array pattern, the calculations of which are based on the number of bays in the antenna and wavelength spacing between the bays, and the element pattern. The element pattern is determined by using measured element data prepared by the EPA, and published in “An Engineering Assessment of the Potential Impact of Federal Radiation Protection Guidance on the AM, FM and TV Services,” by Paul C. Gailey and Richard Tell - April 1985, U.S. Environmental Protection Agency, Las Vegas, NV.

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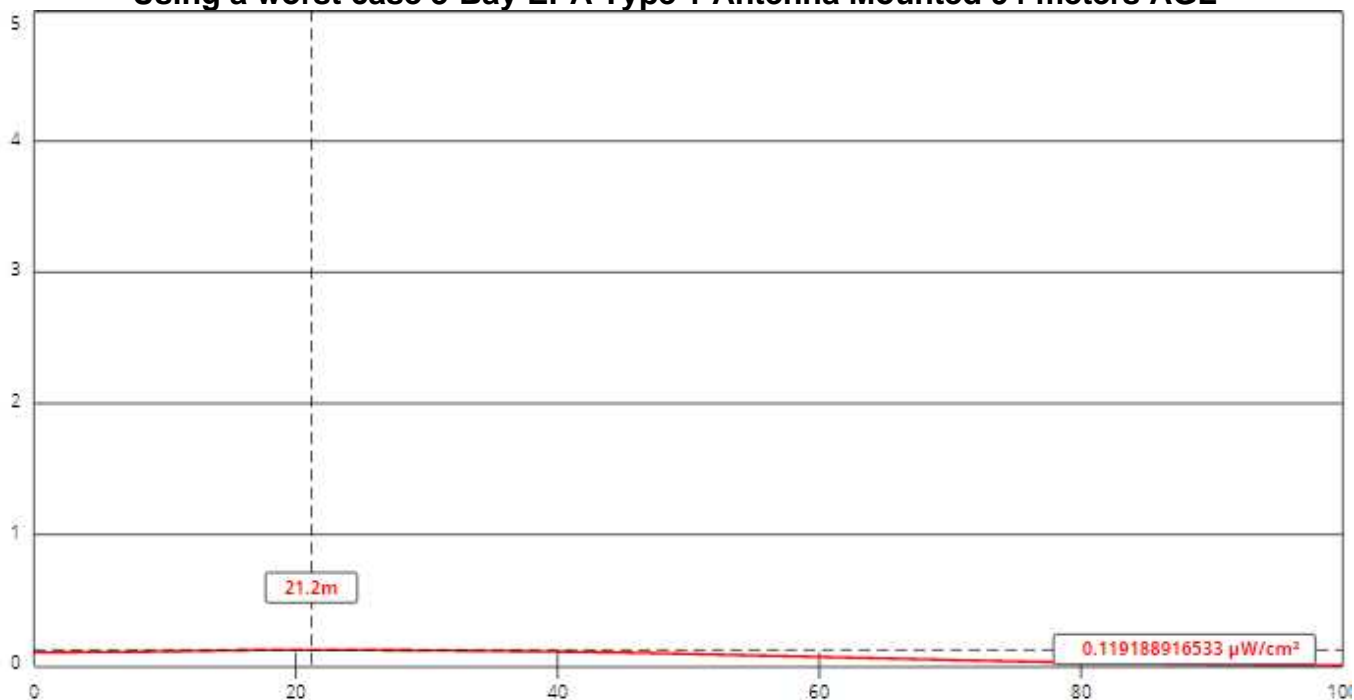
Using a 8-Bay EPA Type 6 Antenna Mounted 80 meters AGL

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K289AI

Using a worst case 3-Bay EPA Type 1 Antenna Mounted 94 meters AGL



[View Tabular Results +](#)

Channel Selection	Channel 289 (105.7 MHz) ▼		
Antenna Type +	EPA Type 1: Ring-and-Stub or "Other" ▼		
Height (m)	<input type="text" value="98"/>	Distance (m)	<input type="text" value="100"/>
ERP-H (W)	<input type="text" value="250"/>	ERP-V (W)	<input type="text" value="250"/>
Num of Elements	<input type="text" value="3"/>	Element Spacing (λ)	<input type="text" value=".5"/>
Num of Points	<input type="text" value="500"/>	<input type="button" value="Apply"/>	

**EXHIBIT 16****COMPLIANCE WITH RADIOFREQUENCY RADIATION GUIDELINES**

The proposed KSQY-FM1 installation will be co-located with other broadcast facilities. The site will, therefore, be considered a “multiple use” site.

The proposed KSQY-FM1 antenna will be a composite directional made up of three Kathrein-Scala Model CL-FM vertically stacked log periodic antennas. Each antenna will be a vertically polarized. The center of radiation for this array will be approximately 109 meters above ground, making it 107 meters above an observer on the ground, who is assumed to be 2 meters tall. A maximum effective radiated power of 17.0 kW (17,000 watts) has been proposed. The addition of this antenna will not require any alteration of the Antenna Structure Registration data for this site.

Equation 10 of OET Bulletin No. 65 can be used to predict the potential exposure to radiofrequency radiation for human observers on the ground as indicated by total power density expressed in units of  $\mu\text{W}/\text{cm}^2$ . This equation states:

$$S = \frac{33.4(F^2)ERP}{R^2}$$

where: S = Total Power Density in units of  $\mu\text{W}/\text{cm}^2$

F = Relative Field of Pattern

ERP = Effective Radiated Power in Watts

R = Distance in Meters

The standard procedure for RF exposure studies considers all locations within 315 meters of the base of the supporting structure. At the proposed center of radiation, the depression angle at this distance is  $18.8^\circ$ . The antenna manufacturer has supplied a tabulation of the relative field for the vertical plane pattern, and the greatest relative field for any depression angle greater than this value is 0.207, which occurs at  $30^\circ$  and  $31^\circ$  below the horizon. To assure a “worst case” scenario, a relative field value of 0.250 has been used for this study. The ERP was set equal to 17,000 watts, and a distance of 107 meters was used, which would be the antenna height above a 2 meter tall observer standing at the base of the tower. This is also the shortest possible distance from an observer on the ground to the antenna. Solving the above equation for S yields a total power density of  $3.10 \mu\text{W}/\text{cm}^2$ .

Within the FM broadcast band, the FCC radiation exposure guideline for uncontrolled environments is  $200 \mu\text{W}/\text{cm}^2$ . Thus, the maximum predicted total power density from the proposed booster would be 1.55 % of the limit for uncontrolled environments. At this frequency, the limit for uncontrolled environments is one-fifth of the limit for controlled environments. Therefore, the predicted exposure level is 0.31 % of the limit for controlled environments.

Chapter 47 of the Code of Federal Regulations, §1.1307(b)(3) states: *“In general, when the guidelines specified in §1.1310 are exceeded in an accessible area due to the emissions from multiple fixed transmitters, actions necessary to bring the area into compliance are the shared responsibility of all licensees whose transmitters produce, at the area in question, power density levels that exceed 5% of the power density exposure limit applicable to their particular transmitter or field strength levels that, when squared, exceed 5% of the square of the electric or magnetic field strength limit applicable to their particular transmitter. Owners of transmitter sites are expected to allow applicants and licensees to take reasonable steps to comply with the requirements contained in §1.1307(b) and, where feasible, should encourage co-location of transmitters and common solutions for controlling access to areas where the RF exposure limits contained in §1.1310 might be exceeded.”* Should the level of radiofrequency radiation at the proposed multiple use site ever exceed the FCC guidelines, the proposed KSQY-FM1 facility is categorically exempt from responsibility for bringing the shared transmitter site into compliance because its contribution is less than 5.0% of the applicable limit.

The facility will be properly marked with signs, and entry will be restricted by means of fencing with locked doors and/or gates. Any other means as may be required to protect employees and the general public will be employed. In the event work would be required in proximity to the antenna such that the person or persons working in the area would potentially be exposed to fields in excess of the guidelines, the station will cooperate with other licensees at the site to reduce power or cease operation during the critical period.